OKM

GERMAN DETECTORS



OKM EVOLUTION NTX

USER'S MANUAL

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CHAPTER 1

Introduction

1.1 Preface

Dear customer,

all of the engineers, sales, training and support staff at OKM GmbH would like to thank you for your purchase of the Evolution NTX.

The Evolution NTX detector works on the principle of Electro-Magnetic Signature Reading (EMSR). Besides the detection of metallic objects this device is also capable of detecting natural features of the earth like formations of strata, cavities, voids, faults, ground water and other non-metallic objects. Then of course this equipment is best suited at detecting sepulchers, treasure, buried utilities, tanks and the like.

The Evolution NTX is able to locate, document and analyze buried objects within various structures and vessels non-intrusively without having to excavate the area. Using EMSR is particularly useful in areas where detection is a must and excavation is not possible. The facile and flexible handling of the Evolution NTX can easily and quickly give reproducible results.

With our team of specialists we guarantee that our products are under recurrent control. Our specialists try to implement new developments in terms of further quality improvements for you.

By purchasing or using one of our products, we cannot guarantee that during the course of your research that you will be successful and have a find. The recognition of hidden and buried objects depends on a huge number of factors. As you well may know there are different soil types all over the world with different levels of natural attenuation. Variable soil properties can and will hamper and alter ultimate scan measurements. Areas where there is an extreme amount of ground water, varying clays, sands and wet soils making scanning more difficult and may reduce the maximum depth capabilities of any and all detection equipment, regardless of make or model.

For more information regarding where this equipment has been used and operated, please visit our web site. Our equipment is constantly being tested and when improvements or upgrades are available, we will list them also on our web site.

It is necessary for our company to protect our developments and all of the information learned during the "Research and Development" phases in creating our technology. We strive to stay within the given framework of legislation, patents and trademark registration.

Please take your time to read this User Manual and familiarize yourself with the operation, functionality and how to utilize the Evolution NTX. We also offer training for your equipment in our factory and on-site. We strive to maintain worldwide dealer network for assistance and support. Please visit our web site for more information.

1.2 Important Notes

Prior to using the Evolution NTX and its accessories, please read these operating instructions carefully. These instructions give information on how to use the detector and potential sources where precautions should be taken.

The Evolution NTX and its accessories serve for the analysis, documentation and detection of sub-surface anomalies and ground disturbances. The recorded data of the ground structure will be transmitted to a PC to give a visual representation using our proprietary software program. Any additional notes to the software should be observed. Please read the user manual of the software!

1.2.1 General Notes

Being an electronic device, the Evolution NTX has to be treated with caution and treated with care as with any electronic device. Any failure to observe the safety precautions given or any use for purposes other than the ones it is designed for may result in damage or destruction of the processing unit and/or its accessories or connected components.

The device has a built in anti-tampering module which will destroy the unit if it is improperly opened. There are no end user serviceable parts on the inside of the unit.

1.2.2 Possible Health Hazards

If used properly this device normally does not pose any health hazards. According to current scientific knowledge, the high-frequency signals are not harmful to the human body on account of their low power.

1.2.3 Surrounding Area

When moving this unit from a cold place to a warmer place, watch out for condensation. Do not immediately operate the unit until any possible condensation could have evaporated. The unit is not weather proof and water or condensation can destroy the unit.

Avoid strong magnetic fields, which may occur in places where there are large electric motors or unshielded loudspeakers. Try to avoid using this equipment within 50 meters (150 ft) of this type of equipment.

Metallic objects on the ground such as cans, tin, nails, screws or debris can influence your scan data and present negative results regarding your scan data. Also it is a good habit to remove any metallic objects off of your person like cellular telephones, keys, jewelry, etc... Do not wear steel toe boots.

1.2.4 Voltage

The power supply should not be outside the indicated range of values. Use only approved chargers, batteries and rechargeable batteries which are included in the scope of delivery.

> Never use the 115/230 Volt mains supply.

1.2.5 Data safety

Data errors can occur if:

- the range of the sender module has been exceeded,
- the power supply of the device or the batteries are too low,
- the cables are too long,
- the unit is operating to close to devices which sends out disturbances or
- atmospheric conditions (electrical storms, lightning, etc...).

1.3 Maintenance and Services

In this section you will learn how to maintain your measuring instrument with all included accessories to keep it in good condition a long time and to get good measuring results.

The following list indicates what you absolutely should avoid:

- penetrating water
- strong dirt and dust deposits
- hard impacts
- strong magnetic fields
- high and long lasting heat effect

To clean your device please use a dry soft rag. To avoid any damage you should transport the device and accessories always in the appropriate carrying cases.

Prior to using your Evolution NTX please be sure that all batteries and accumulators are fully charged. Also allow the batteries to completely discharge before recharging them, regardless if you are working with the external battery or with internal accumulators. This way your batteries will have a long and durable life.

To charge the external and internal batteries, use only the approved chargers which are part of our scope of delivery.

1.4 Danger of Explosion during Excavation

Unfortunately, the last two world wars also made the ground in many places of the world a potentially explosive scrap heap. A host of those lethal relics are still buried in the ground. Do not start digging and hacking for an object wildly when you receive a signal of a piece of metal from your device. Firstly, you might indeed cause irreparable damage to a truly rare find, and secondly, there is a chance that the object reacts in an insulted way and strikes back.

Note the color of the ground close to the surface. A red or reddish color of the ground is an indicator of rust traces. As regards the finds themselves, you should definitely pay attention to their shape. Curved or round objects should be a sign of alarm, especially if buttons, rings or little pegs can be identified or felt. The same applies to recognizable ammunition or bullets and shells. Leave that stuff where it is, do not touch anything and, most importantly, do not take any of it home with you. The killing machines of war made use of diabolical inventions such as rocker fuses, acid fuses and ball fuses. Those components have been rusting away in the course of time, and the slightest movement may cause parts of them to break and be triggered. Even seemingly harmless objects such as cartridges or large ammunition are anything but that. Explosives may have become crystalline over time, that is, sugar-like crystals have formed.

Moving such an object may cause those crystals to produce friction, leading to an explosion. If you come across such relics, mark the place and do not fail to report the find to the police. Such objects always pose a danger to the life of hikers, walkers, farmers, children and animals.

CHAPTER 2

Technical specifications

The following technical indications are medial values. During operation small variations are quite possible. Technical changes due to development are possible!

2.1 Control unit

Dimensions (H x W x D)	540 - 810 x 150 x 280 mm
Weight	about 1.5 kg
Input (max.)	19 V DC, 3.16 A, 60 W
Processor / Main CPU	Cortex M3, 32 MHz
Processor / Slave CPU	Cortex M0, 24 MHz
Display	3.5" Resistive touch, 480 x 320 Pixel
Display CPU	Cortex M3, 32 MHz, 128 KB RAM
Data memory	4 GB
Sample rate	1024 values / second
Measurement resolution	16 bit
Operating temperature	-10 – 60 °C
Storage temperature	-20 – 70 °C
Audio	Internal speaker / Bluetooth
Air humidity	5 % – 75 %
Waterproof	No
Technology	GST[1], EMSR[2]
Sensor / Coil technology	SCMI-15-D / VLF

2.2 Wireless data transfer

Technology	Bluetooth 5.1
Frequency range	2.402 – 2.480 GHz
Maximum transfer rate	1 Mbps
Maximum Transmitting Power	+8 dBm
Maximum range	approx. 10 m

[1] GST = Ground Scan Technology, [2] EMSR = Electro-Magnetic Signature Reading

CHAPTER 3

Scope of delivery

In the following section you can find all standard equipment and optional parts of Evolution NTX. The scope of delivery can be different in some circumstances because of some optional accessories which are not included in the basic equipment.

Description	Quantity
Control unit	1
Bluetooth headphones	1
Software "Visualizer 3D Studio"	1
Charger and traveling adapter	1
User manual	1
Carrying case	1
Tablet PC / Laptop	optional

Table 1: Scope of delivery

CHAPTER 4

Control elements

In this section you will learn more about the fundamental use of all control elements for this measuring instrument. All connections, inputs and outputs are explained in detail.

4.1 Control unit with display

Figure 4.1 represents all control elements of the Evolution NTX.

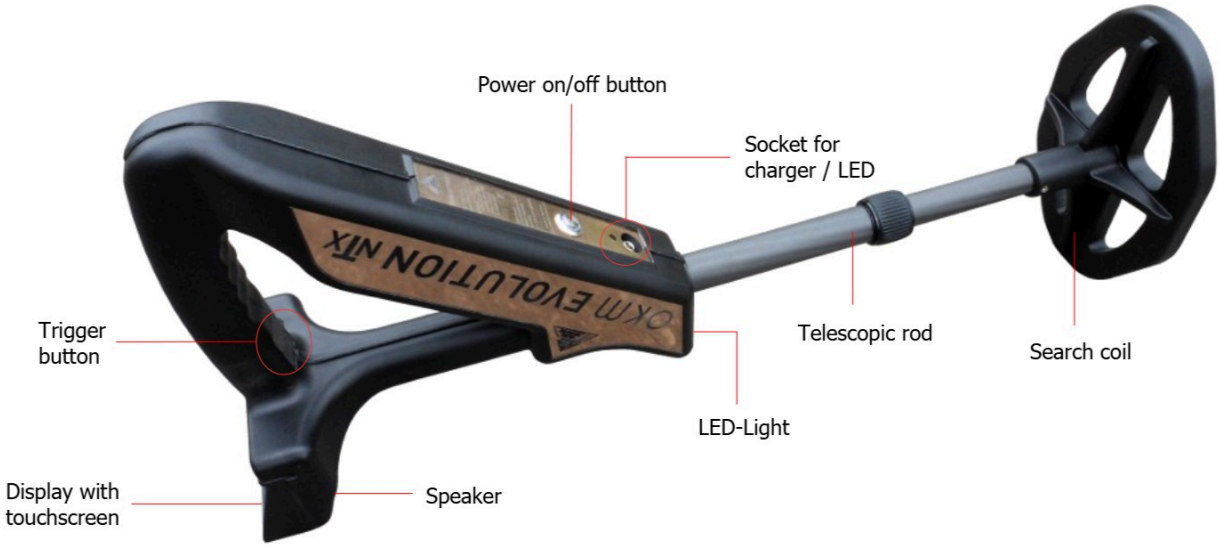


Figure 4.1: Overview of control elements of the control unit

Power on/off button: The power on/off button is used to switch your device on and off. If the device is switched off, hold down the power on/off button until the boot screen from figure 6.1 of page 17 appears on the display. If you like to switch off your device, hold down the power on/off button until the display turns off.

Speaker: The internal speaker is activated by default. The speaker's volume can be regulated by using the icon , which is displayed in the left upper part of the display (see section 6.4.1 on page 29).

Socket for headphones: You may connect commercial headphones to your control unit. As soon as connected the internal speaker is inactive and any audio output goes through the connected headphones only.

Socket for Charger / Charge LED: When the internal battery goes low, you have to recharge it by connecting the appropriate charger to the socket for charger. As long as charging is in progress the charge LED is shining orange. When the charge LED turns off the battery is fully charged.

Display with touchscreen: On the display of the device all operating modes, information and measuring functions are shown. The display is equipped with a touchscreen, which means you just need to touch any visible button to activate its functionality.

Trigger button: The function of the trigger is to start a measurement or soil reconciliation (ground balance). In that case, using the trigger starts the appropriate operation.

Telescopic rod: The telescopic rod allows an individual adjustment of the length of the probe. For transportation reasons the probe should be pushed together completely. During a measurement the rod can be adjusted as required.

LED-Light: The LED-light of the telescopic probe can be switched on and off by touching 💡 or 💡. The LED-light is especially useful for night searches.

4.2 Bluetooth Headphones

The Evolution NTX can be operated with any Bluetooth headphone available on the market. Your Evolution NTX already comes with Bluetooth headphones similar to figure 4.2.



Figure 4.2: Bluetooth headphones with accessories

To use the headphones with your metal detector, please follow these simple steps:

1. Select "Settings" from your main menu
2. Now select "Headphones"
3. Power on your Bluetooth headphones and push the pairing button

The Evolution NTX tries connecting now. If the Bluetooth connection between headphones and device has established successfully, the headphones icon switches from to . Otherwise you should try again.

CHAPTER 5

Assembly and Preparation

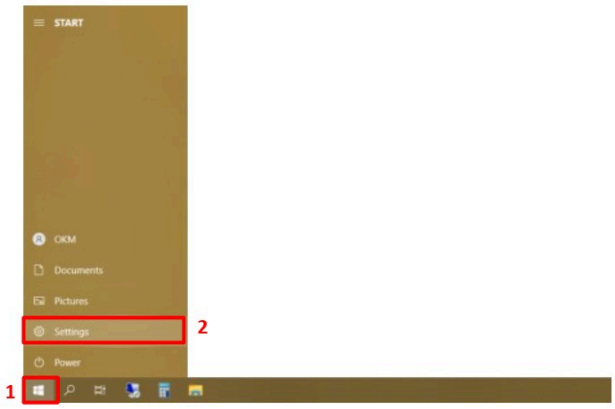
This section explains how to assemble the device and how to prepare a measurement.

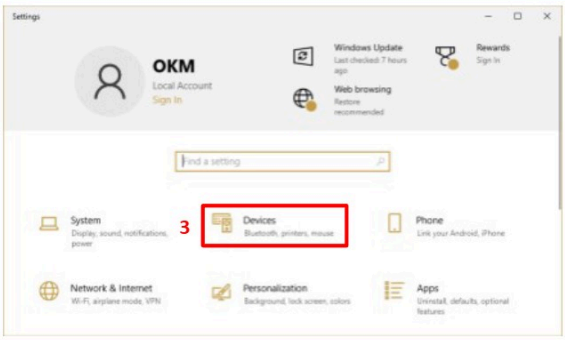
Before you can use your Evolution NTX for a field measurement you should do some preparations.

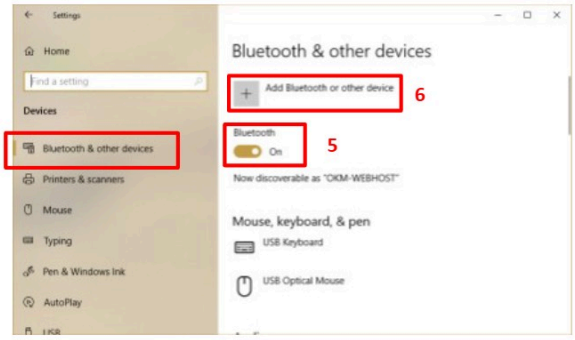
5.1 Pairing Bluetooth

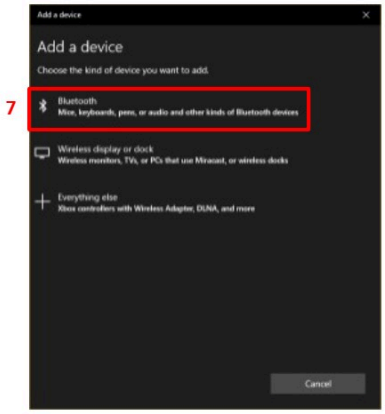
Prior to transferring measurement data to the Visualizer 3D software, the Bluetooth of your computer must be paired with your OKM detector.

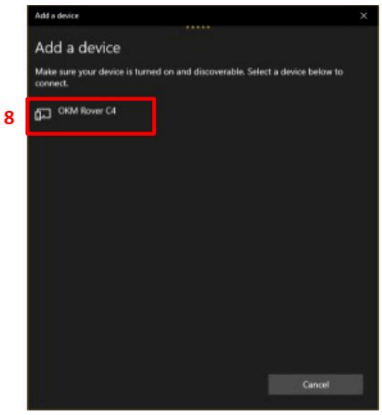
must be paired with your OKM detector.

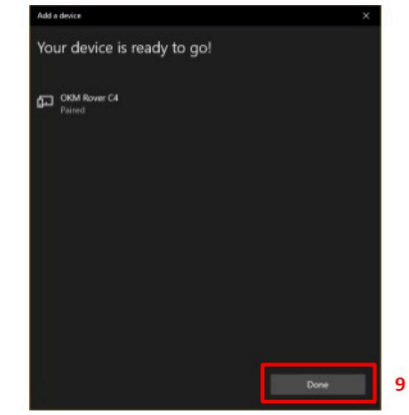












5.2 Assemble Device



Step 1

Before operating your detector, make sure the internal batteries are recharged. The orange charging LED indicates the charge status:

– LED is on = charging

– LED is off = fully charged



Step 2

Release the lock of the telescopic rod by screwing it to the left. Afterward pull out the lower part of the rod and arrest the lock by screwing it to the right. Adjust the length of the detector according to your own body height.



Step 3

Switch on the detector by pushing the power on/off button. The operating-LED of the button should light up.

CHAPTER 6

Operating modes

In this section you will learn more about operating the device. Every operating mode will be explained in a proper subsection.

After switching on the detector by using the power on/off button, the boot screen from figure 6.1 appears on the screen.



Figure 6.1: Boot screen after switching on the control unit

It takes a few moments until the program is ready and the main menu appears on the display. That's the place where to select the operating modes and functions.

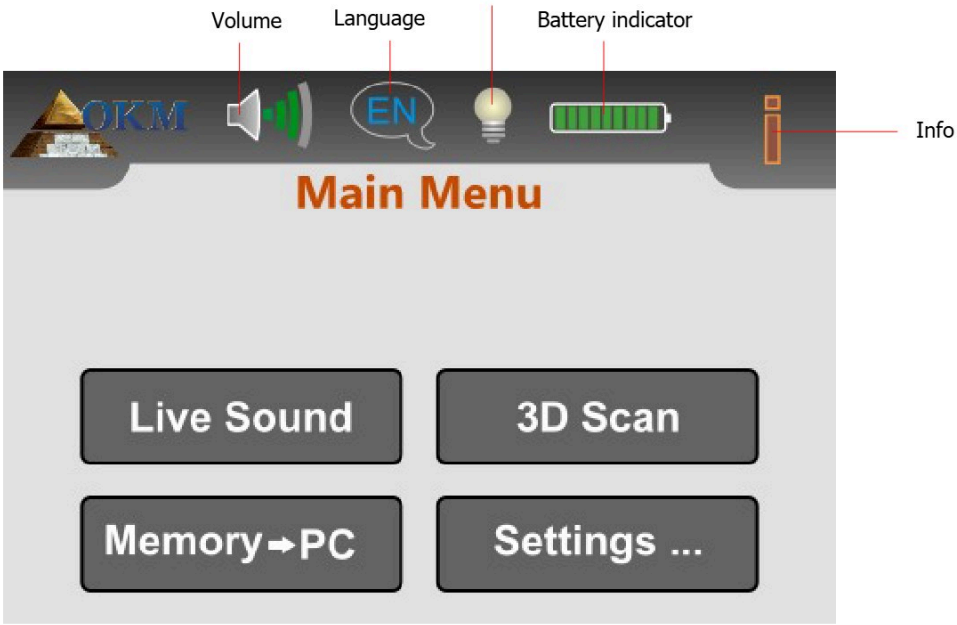


Figure 6.2: Main menu of the control unit

Volume: Touch the  icon if you like to adjust the volume of the internal speaker (see section 6.4.1 on page 29).

Language: Touch this icon to change the operating language (see section 6.4.2 on page 30). The current selection is represented by the appropriate language code (e. g. 

for English).

LED-Light: By using this icon the LED-light can be regulated and its current state will be indicated. Just touch this icon to switch on and off the LED-lights. The following states are possible:

-  LED-light is switched off

- 💡 LED-light is switched on

Battery indicator: The battery indicator shows the charge condition of the internal battery.

Info: When you touch this symbol you will see important device information like the serial number or firmware version, which are necessary for our support team.

The Evolution NTX supports following functions and operating modes, which you can select from the control unit's main menu (see figure 6.2):

- **Live Sound**
  Process an acoustical measurement with activated metal detector.
- **3D Scan**
  Process a graphical measurement for the evaluation on a computer.
- **Memory ⇄ PC**
  Transfer the measured values via Bluetooth from the internal memory to a computer or Tablet PC.
- **Settings**
  Adjust several settings like brightness, language or volume.

The complete menu structure of Evolution NTX is displayed in figure 6.3.

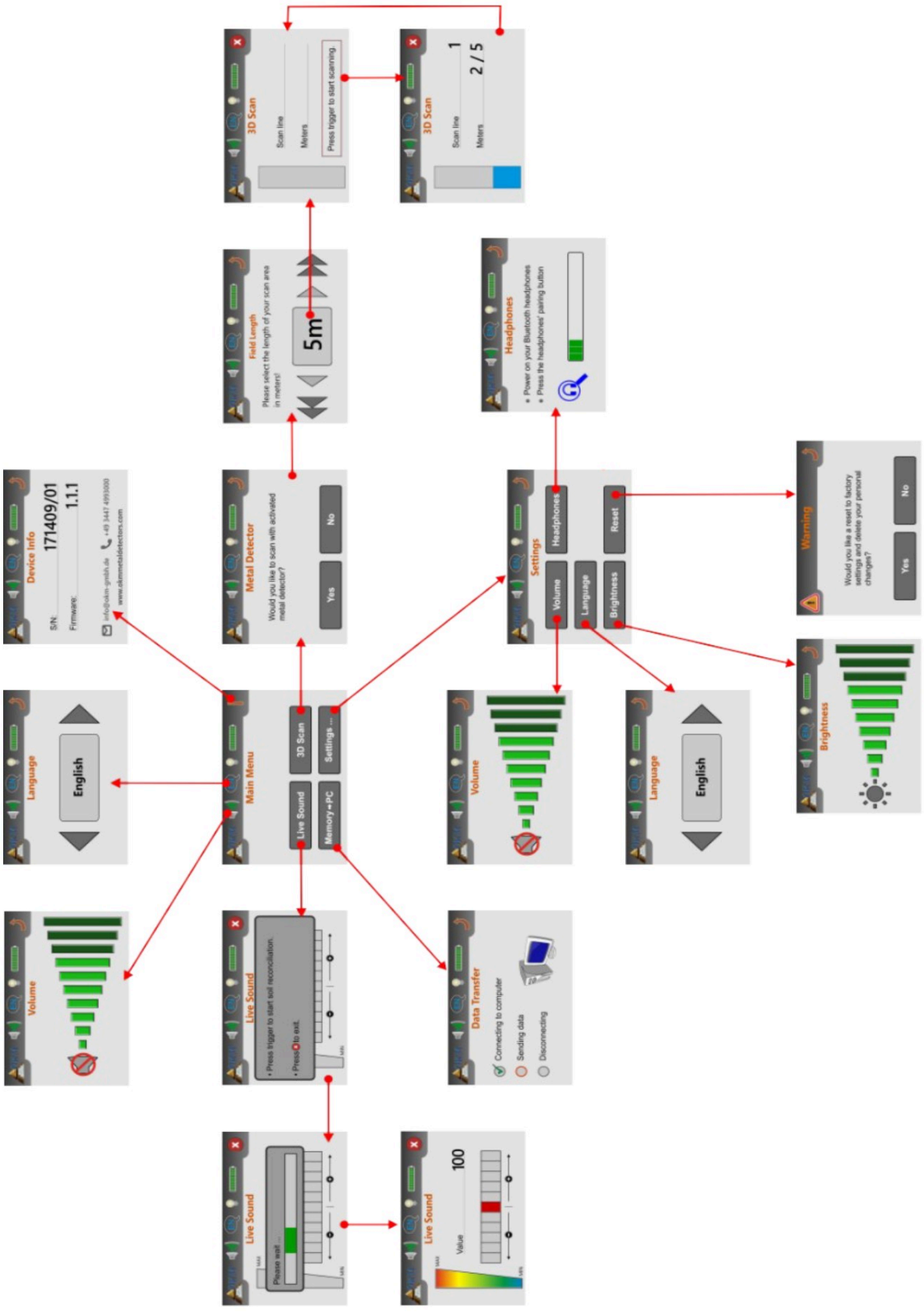


Figure 6.3: Overview about menu structure

6.1 Live Sound

The operating mode "Live Sound" is very useful to detect smaller metal objects. This mode has only tones and no graphical 3d representation will be generated. No measured values will be saved into memory. During this operating mode only the metal detector (VLF search coil) is activated and therefor only low penetration depths are possible. This mode is especially useful to locate objects near to the surface, like coins and rings.

Touch the button „Live Sound“ from the main menu. The screen from figure 6.4 appears on the display of your control unit.

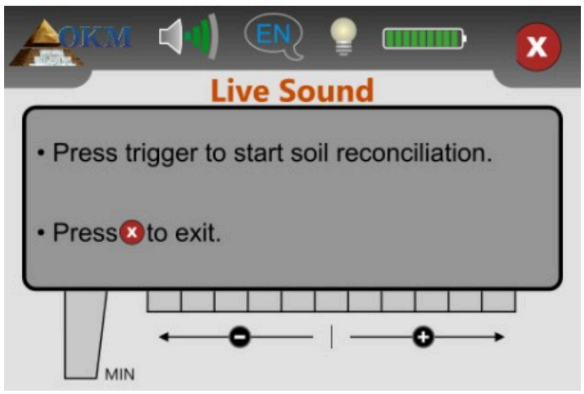


Figure 6.4: Soil reconciliation in operating mode "Live Sound"

Before processing the measurement, a soil reconciliation (ground balance) needs to be done. Hold the probe in the same way you would do during the scan process, i. e. approx. 5 - 10 cm straight over the ground as shown in figure 6.5 (left side). Push the trigger button of the detector and sweep the search coil evenly over the ground in front of you. Study figure 6.5, where the mentioned procedure is clarified.



Figure 6.5: Processing the soil reconciliation

During this soil reconciliation you will see the progress bar from figure 6.6 on your display. As soon as this bar disappears, the soil reconciliation is over.

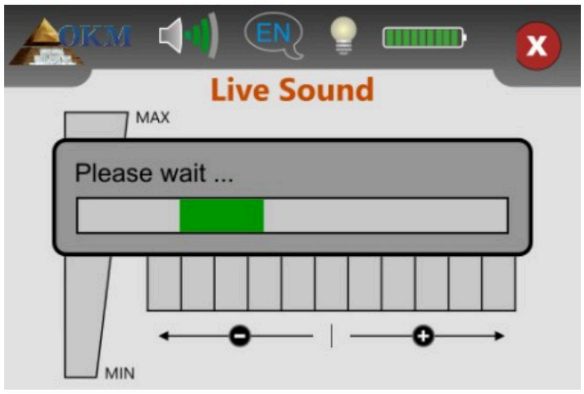


Figure 6.6: Soil reconciliation

After the soil reconciliation is finished, you are free to start searching for metals. In case the metal detector reacts too turbulent and sounds nearly everywhere, you should adjust the sensitivity manually. Therefor you just select one of the sensitivity levels on the display as shown in figure 6.7.

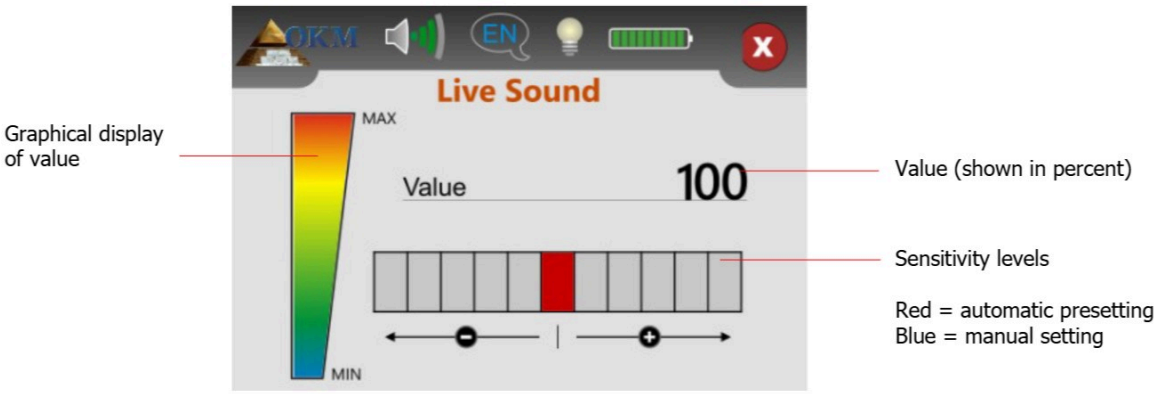


Figure 6.7: Regulation of detector sensitivity

After finishing the automatic soil reconciliation the sensitivity is preset and shown in red. If you want to increase the sensitivity of the metal detector, you have to touch one of the 5 sensitivity levels on the right side next to the default setting. Your manually chosen level will be selected and colored in blue. If you want to decrease the sensitivity, you just need to touch any of the 5 sensitivity levels on the left side next to the default setting.

Adjusting the sensitivity gives you more control over the search coil. The higher the sensitivity the smaller or deeper objects may be detected. If you perform scans in areas known to have high levels of mineralization, it is recommended to decrease the sensitivity.

The displayed value represents the strength of the deflection in percent. At high deflections the value is always 100. When the sensitivity is optimally adjusted you will hear the sounds from metallic objects below the detector. Use the operating mode "Live Sound" to search and clear an area of small objects near the surface. When scanning an area in the “3D Scan” operating mode the least amount of metal on or near the surface, the better your results will be. Of course you can find larger metal objects deeper underground. As a general rule: The larger the objects the deeper the detection!

The operating mode "Live Sound" is also very useful as Pin Pointer during the excavation. In case you dug a bigger hole and don't remember the exact position of the object, simply use the operating mode "Live Sound" for any quick location of the buried object.

> You can only metal detect objects in the "Live Sound" operating mode while you are sweeping the search coil over the ground (Motion Detector).

Touching the icon ⓧ will exit the "Live Sound" mode and returns to the main menu.

6.2 3D Scan

The "3D Scan" operating mode allows a graphical measurement of an area for later analysis on a computer.

Switch on the device and select the "3D Scan" operating mode from the main menu. First you have to decide whether you want to scan with metal detector activated or not (see figure 6.8). If you touch the “Yes“ button, the VLF metal detector will be activated during the measurement. This is especially reasonable when you are looking for freshly buried precious metals. Without the metal detector activated you may concentrate especially on long time buried objects as well as non-metallic objects.



Figure 6.8: Activate metal detector

In very awkward soil conditions (e. g. high mineralization) it makes sense to deactivate the metal detector when scanning in 3D mode. To deactivate the metal detector, select "No".

The next step is to select the length of a scanning path (field length), like shown in figure 6.9.

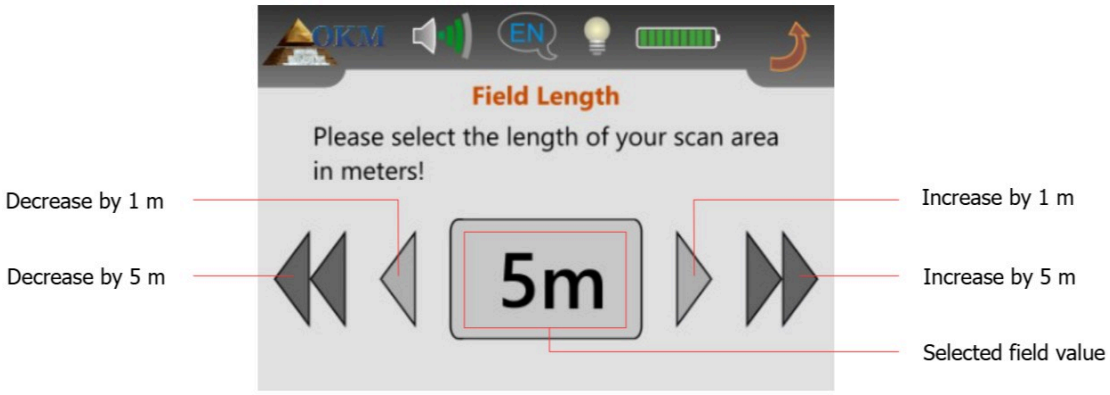


Figure 6.9: Select field length

You just need to take care that you apply the right walking speed to your appropriate selection. After adjusting the right field length simply touch onto the selected field value.

If you work with activated metal detector, it is necessary to process a soil reconciliation before scanning. Therefor the message from figure 6.10 appears on the display of your device.

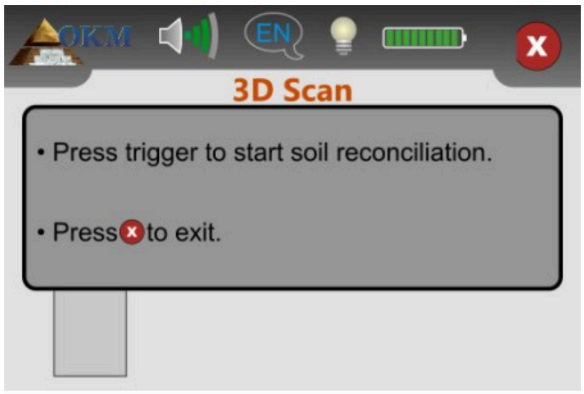


Figure 6.10: Soil reconciliation with activated metal detector

The soil reconciliation process is the same as described in section 6.1 „Live Sound" on page 21. As soon as the soil reconciliation is finished, the device is ready to measure the first scanning path and you will be requested to start the first line (see figure 6.11, left).

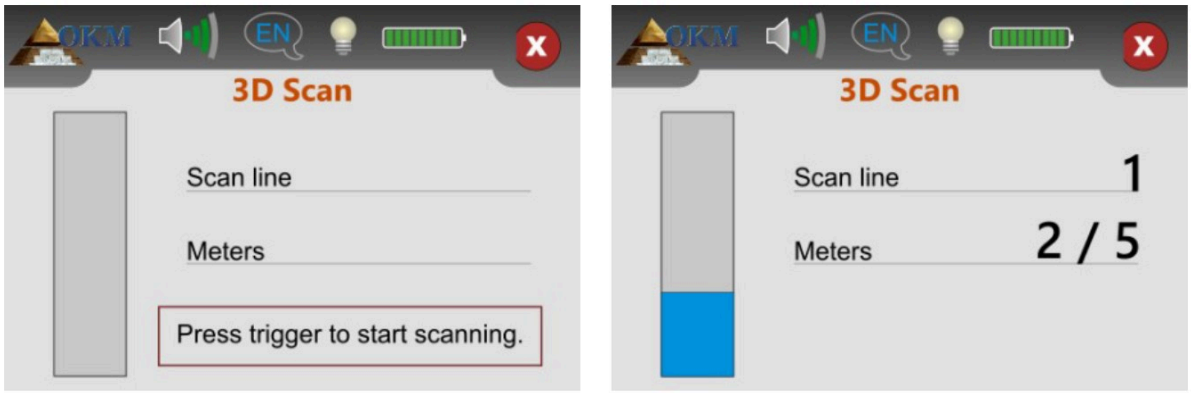


Figure 6.11: Display representations in operating mode "3D Scan"

Position yourself on the starting point of your scan field and push the trigger button. On the display you will always see the number of the current scan line as well as how many meters are already measured. In the right picture of figure 6.11 the current scan line is 1 and 2 of 5 meters has been scanned already. Beware that the shown meters do not correspond with the real length of your scanning path. Instead it depends on your walking speed.

Walk continuously and with constant speed to the end of the line. You should manage your walking speed in that way, that you reach the end of the scanning path when the device stops automatically. Afterward you move to the starting point of the next scan line and push the trigger again. The device will again stop by itself at the end of the scan line.

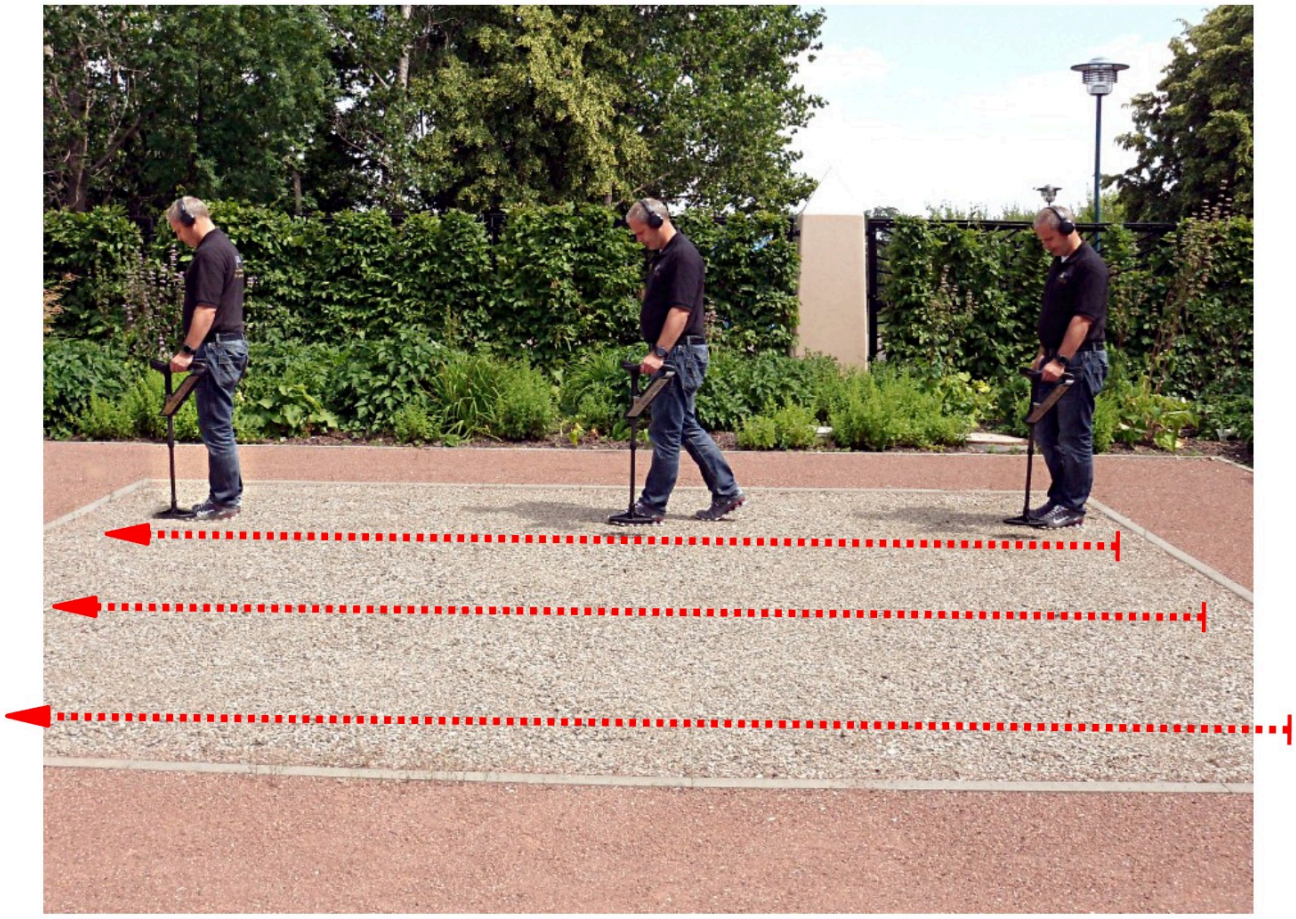


Figure 6.12: "Parallel" measurement in operating mode "3D Scan"

Measure all remaining scanning paths in the same manner until the whole area has been scanned. Touch the icon to save the current measurement, exit the "3D Scan" operating mode and return to the main menu.

Further information about the general procedure for scanning outdoors you can read in chapter 8 "Field procedure" on page 35.

6.3 Memory ⇄ PC

The operating mode "Memory ⇄ PC" is used to transmit the stored measured values from the internal memory to the computer. Therefore you have to prepare your software according to chapter 7 “Preparing Data Transfer” on page 33.

> Further information on how to set up your software for the data transfer you can read in the user's manual of the purchased software product.

Select the operating mode "Memory ⇄ PC" from the main menu to start the data transfer. On the display of your device the screen from figure 6.13 appears.

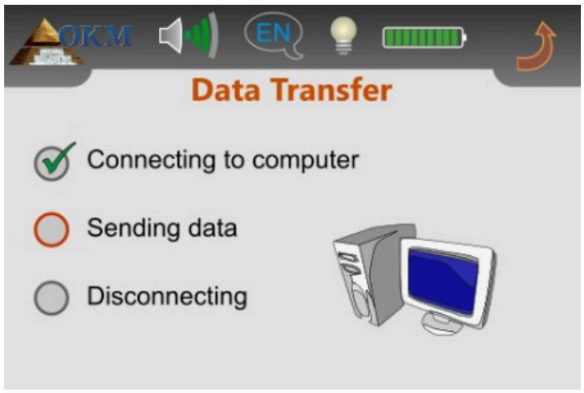


Figure 6.13: Data transfer

The complete transferring process contains 3 steps:

1. Establish the Bluetooth connection to the computer
2. Transfer the data to the computer
3. Disconnect the Bluetooth connection

As soon as the Bluetooth connection has been established the stored measured values are sent automatically to the computer. After transferring the data, the connection will be disconnected and the display switches back to the main menu. In case that no Bluetooth connection was established, the error message from figure 6.14 appears in the display of your device.

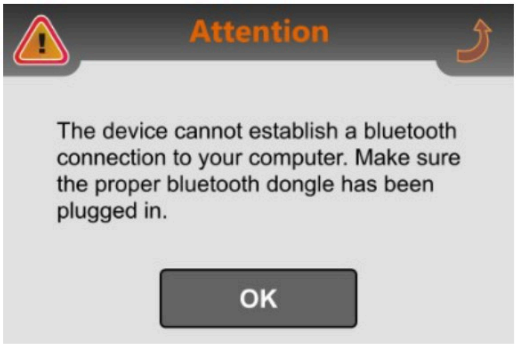


Figure 6.14: Error to connect to computer

6.4 Settings

The Evolution NTX offers several settings, which can be adjusted to your individual needs. Therefor you need to select "Settings" from the main menu and the device presents a sub menu as shown in figure 6.15.

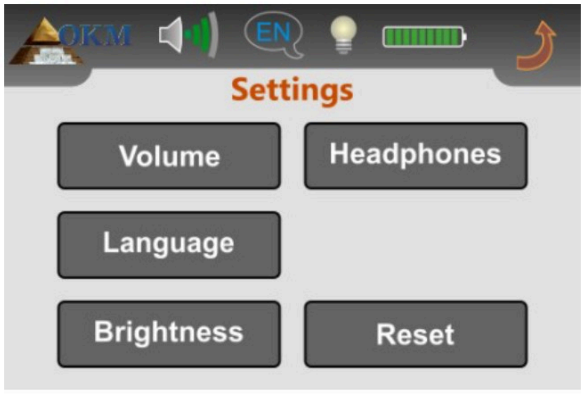


Figure 6.15: Menu "Settings"

In the following subsections the available settings will be described in detail. If you want to return to the main menu, just touch the icon.

6.4.1 Volume

The volume can be adjusted at any time by touching the icon in the upper left corner of the display. Touch any of the 10 volume bars to select an appropriate volume level. If you want to mute the internal speaker, touch the icon which is located left to the smallest volume bar.



Figure 6.16: Adjustment of volume

Touch the icon to apply the selected volume.

6.4.2 Language

You may chose from a variety of different languages and select the one which is the best your you. Touch the selectors ◀ or ▶ until you found the right one.



Figure 6.17: Adjustment of language

Finally you touch the ↩ icon to apply that language and exit the screen. From now on all texts will be shown in the selected language. You may change the language at any time during the operation of the device by simply touching the EN icon on the upper left side of the display.

6.4.3 Brightness

You may change the brightness of the display to make it darker or brighter. The darker the screen is the more energy will be saved.



Figure 6.18: Adjustment of contrast

Touch any of the 10 brightness bars to select an appropriate brightness level and apply your selection by touching the icon.

6.4.4 Headphones

If you want to use your Bluetooth headphones with the detector, you first have to enter the Headphones screen first according to figure 6.19.



Figure 6.19: Connect Bluetooth headphones

In the next step you must push the pairing button of your Bluetooth headphones and wait for any connection. Please read section 4.2 “Bluetooth Headphones” on page 12 for additional information regarding the Bluetooth headphones!

6.4.5 Reset

By using the option "Reset", you may reset all settings to its default factory settings. Just confirm the security message from figure 6.20, by selecting the "Yes" button. Now all your settings like language, brightness, volume etc. will be set to its default factory presets.



Figure 6.20: Reset to factory settings

If you decide not to reset your settings, just touch the button "No" or the icon and all settings stay unchanged.

CHAPTER 7

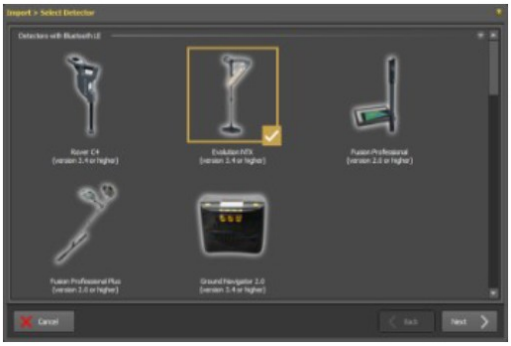
Preparing Data Transfer

This chapter explains the general procedure of preparing the data transfer as well as establishing a Bluetooth connection between Evolution NTX and computer.

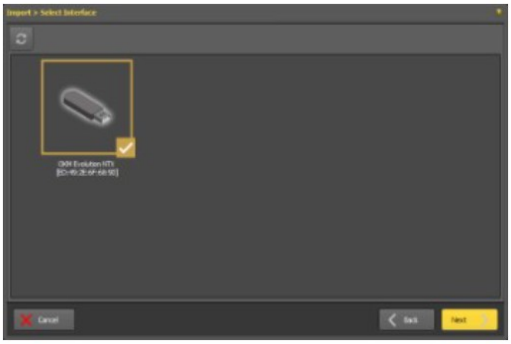
Please make sure you have processed the steps from section 5.1 “Pairing Bluetooth” on page 14 once, before continuing.



Step 1
After launching your Visualizer 3D Studio software you have to select File > Import from the main menu or you simply click the icon.



Step 2
Select your OKM detector “Evolution NTX (version 3.4 or higher)” from the list and click Next.

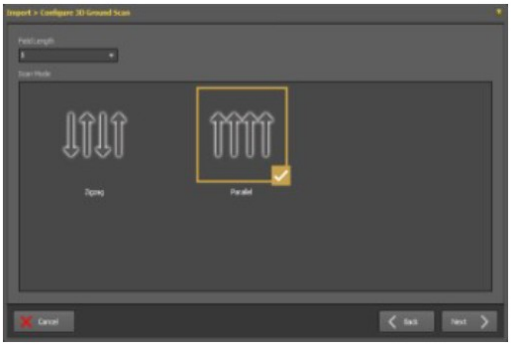


Step 3
Wait a short moment until your device interface appears in the list. Now select the entry and click Next.



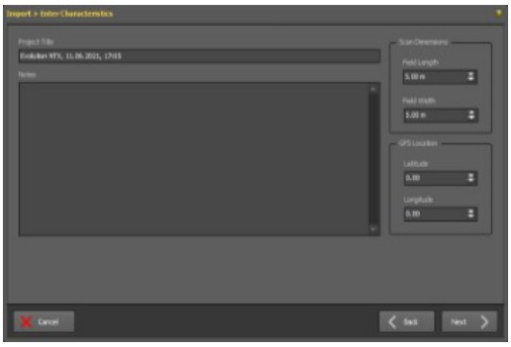
Step 4

Select the operating mode 3D Ground Scan click Next to set up further information.



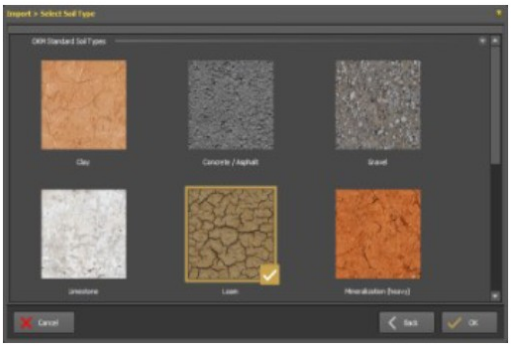
Step 5 (only for 3D Ground Scan)

Enter the Field Length and select the Scan Mode, then click Next.



Step 6 (only for 3D Ground Scan)

Set up a title and enter your scan field dimensions. You may also enter GPS coordinates and write down additional notes and remarks. Then click Next.



Step 7 (only for 3D Ground Scan)

The last step is to select the corresponding soil type.

CHAPTER 8

Field procedure

This chapter gives practical instructions about the general procedure of scanning an area. The different scanning methods and procedures will be explained in detail.

8.1 General scanning procedure

In general every scan always starts on the bottom right corner of your scan area. Starting from this point, you should walk scan path by scan path, whereby every following path is situated on the left side of its previous path. During walking these lines, the measurement values will be recorded and depending on the selected operating mode either transferred directly to a computer or saved into the memory of the device.

The device stops at the end of each finished scan line, so that the user can find the starting position of the next line. In this way, all paths will be recorded and the area will be measured.

Figure 8.1 shows all 4 possible starting positions and the corresponding first scanning path. Depending on the composition of your terrain you can determine the optimal starting point for your measurement by yourself.

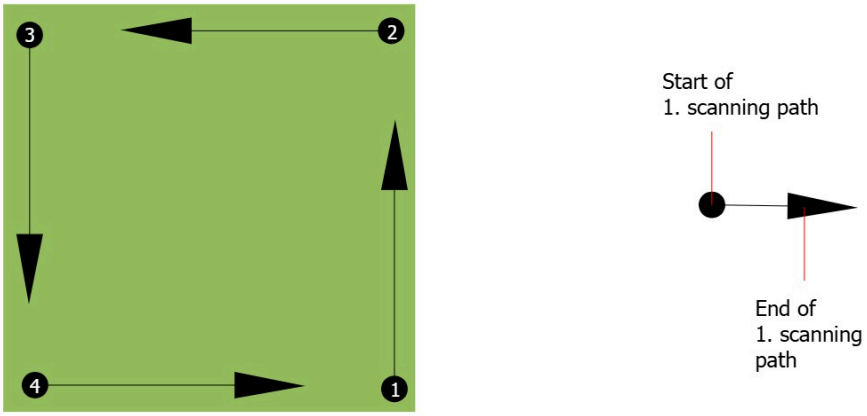


Figure 8.1: Starting position of a scan area

The scanning paths may be referred as "Zig-Zag" or "Parallel" traverses. Also the number of impulses (measure points), which are recorded during one scanning path can be adjusted individually depending on the size of your scan area (length of scanning path).

8.1.1 Scan Mode

There are two general techniques to surveying an area with the Evolution NTX:

- **Zig-Zag**
  The starting position of two scanning paths next to each other is on the opposite side of the measured area. You will record data on your scanning path and on the return path as well.

- **Parallel**
  The starting position of two scanning paths is always on the same side of the measured area. You will only record data in one way and in one direction, while you should return and walk back to the starting position of the next scanning path without recording data.

Figure 8.2 represents both techniques schematically.

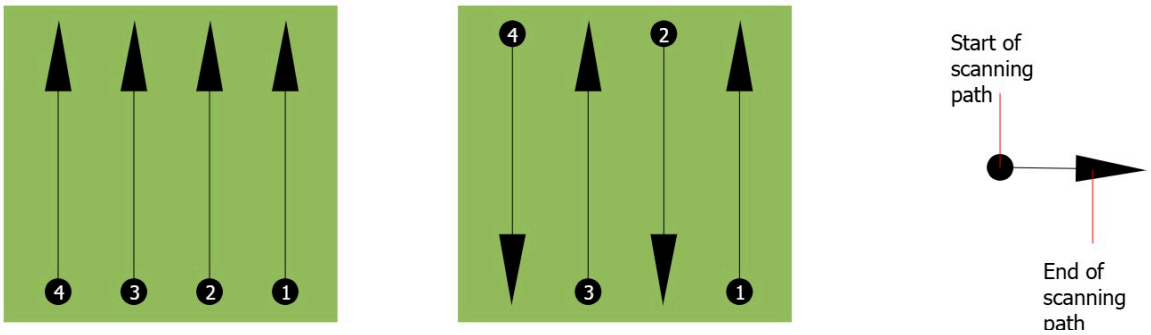


Figure 8.2: Scan modes to measure an area

Doing the scan in "Parallel" mode you will start on the bottom right corner of your scan area (point ❶) to walk and record a scan path towards the upper right corner of the area. After recording the first line, you should walk back to the starting point and move to the left of the first scan line to start the scan path 2 (point ❷), to start there the second scanning path. In this way all other paths will be scanned, until you have reached the left side of your measure area.

Doing the scan in "Zig-Zag" mode you will start also from the bottom right side of your measure area (point ❶) to walk and record a scanning path towards the right upper corner of the measure area. Different from the parallel measurement, you should continue recording data while walking back the second scanning path. So you go to the starting point of the second scanning path (point ❷) and scan in the opposite direction. In this way, all other paths will be scanned in the scan mode "Zig-Zag" until you have reached the left side of your measure area.

The distance between the scanning paths should be consistent during one measurement but can vary from measure area to measure area. If you mostly look for smaller targets than you should also select a smaller distance between the lines. A standard rule is: The smaller the distance between the paths, the more accurate your scans will be. When you are conducting your first scans the lines should not be to close together to locate possible targets.

8.1.2 Regulating the length of a scanning path

You have to select the length of a scanning path before starting the measurement. The bigger the length of the path the more measure values will be recorded and the slower you have to walk the single scanning paths. The device stops automatically after the assumed length has been reached and waits for the next path.

> Keep in mind the length of the scanning path which you have selected. This amount should be entered later in the software program, when transferring the data to a PC, to receive all measured data correctly from your measuring instrument!

There is no special rule for selecting the right length but there are different aspects which should be considered. These are some considerations

- the real length of your measured area and
- the size of the objects you are searching for.

A preferable distance between two measure values is about 15 cm to 20 cm. The smaller the distance between two points, the more exactly the graphical representation will be. If you are looking for small objects you have to select a smaller distance, for big objects you can increase the distance between the impulses.

Figure 8.3 shows the effects of the distance between the measured values per scanning path for some objects.

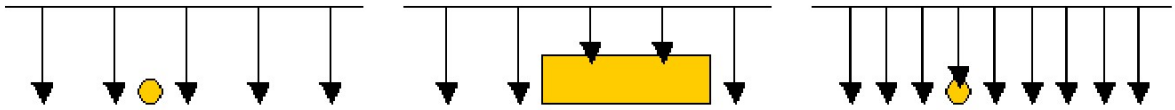


Figure 8.3: Effects of changing the number of impulses and their distance

Figure 8.4 shows the difference between very few measuring points (left side) and much more measuring points (right side) on the same length of scanning path. Therefor the second record (right side) shows much more details and also smaller objects can be seen.

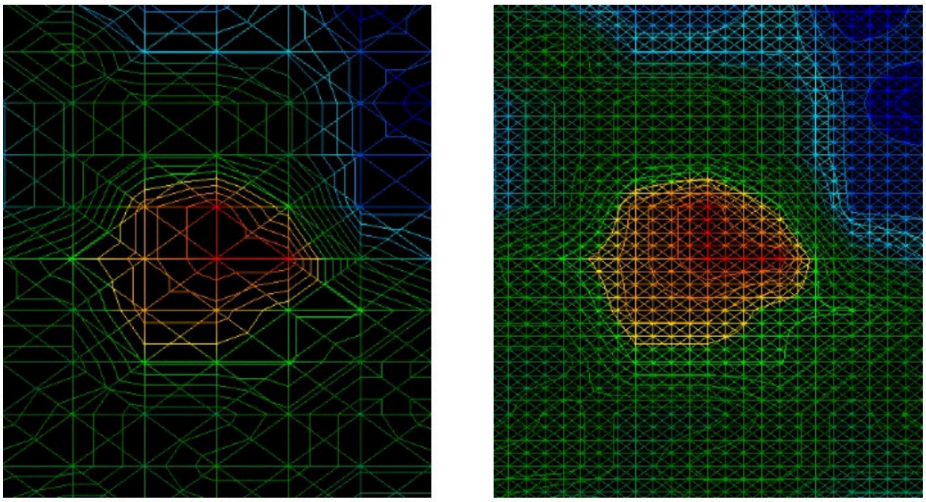


Figure 8.4: Comparison of low and high number of impulses

Do not hesitate to record more measurements with different field length. For example you can scan a large area before doing a second detailed precision measurement. Especially if searching for bigger objects you can proceed like this. With this manner you can measure a larger area very quickly and afterward you make new scans localizing the suspect targets.

When conducting a scan it is important to not only make note of how many measuring points are being used but to get a clear picture of what you are scanning, it is very important to watch your speed. Every scan line should be measured at the same speed as the previous line.

Figure 8.5 shows what can happen, if you walk at different speeds during your scan.

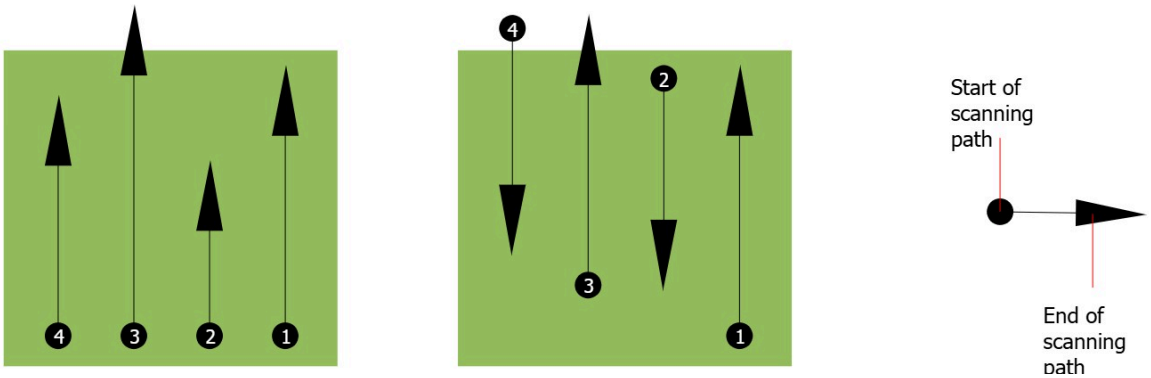


Figure 8.5: Different walking speeds during scanning

Using a different walking speed in the scanning paths, will cause displacements in the scanning path. As a matter of fact, a target can get cut into several smaller items or completely lost because it was missed. Later when the data is downloaded for further analysis, speed errors can make a target completely unidentifiable and may be discarded.

In general, the following rule is valid: Keep scans at practical sizes where you can see the beginning and stop lines and can comfortably traverse an area to keep your speed and the distances reasonable.

8.2 Special advice for field procedure

There are some aspects which you should take note of when conducting scans. In principle, a scan is only as good as the path that was taken. Making errors while scanning will show up in the final graphical representation also as an error. This will cause frustration and lost time.

Before you start with a measurement in the field, you should think of what you are looking for and if the selected area is suitable. Measuring without a plan usually will produce unacceptable results. Please consider the following advice:

- What are you looking for (graves, tunnel, buried objects, ...)? This question has direct effects on how a scan is conducted. If you are looking for larger targets, the distance between the single measure points and scanning paths can be larger, as if you are looking for small targets.
- Inform yourself about the area, where you are searching. Does it make sense to detect here? Are there historical references which confirms your speculation? What type of soil is on this area? Are there good conditions for data recording? Is it allowed to search at this place (e.g. private property)?
- Your first measurement in an unknown area has to be large enough to get representative values. All further control measurements should be adjusted individually.
- What is the form of the object you search? If you are looking for an angular metal box, the identified object in your graphic should have a form according to this.
- To get better values concerning depth measurements, the object has to be in the center of the graphic, which means it has to be framed by normal reference values (normal ground). If the object is on the side of the graphic and not totally visible an estimated depth measurement is not possible and also measurement of size and form are limited. In this case, repeat the scan and change the position of your scan area, to receive an optimal position of the anomaly inside of the graphic.
- There should not be more than one object in a scan. This will influence the depth measurement. It is useful to scan partial areas over such targets.
- You should do at least two controlled scans to be more sure about your results. This is also important to recognize areas of mineralization.
- Most important rule when dealing with mineralization. REAL TARGETS DON'T MOVE! If your target moves then it is most likely mineralization.

8.2.1 Orientation of probe

During one measurement the probe should have always the same distance to the ground. Generally we recommend a height of about 5 – 10 cm from the surface of the ground if possible.

In the event that you are going to go over stones, wood or high grass that is higher, start your scan with the sensor higher right from the beginning. In circumstances like these, then perhaps you will need to start the scan with the probe at a height of 2 feet (50 cm) and keep it at that level for the entire scan. It is important to maintain the height, this will eradicate many errors. As a rule, do not change the height during a scan for it may create unnecessary errors.

Another important aspect is the physical orientation of the probe. During the "Parallel" scan mode the orientation of the probe does not change because you are always measuring in the same direction.

During the "Zig-Zag" scan mode the orientation of the probe is changing because at the end of each scanning path you turn yourself around. In the case that your obtained graphic includes red or blue stripes. These stripes throughout a scan are commonly referred to as “Rotational Errors”. In that situation you should repeat your measurement in the "Parallel" scan mode.

8.2.2 Parallel or Zig-Zag?

For skilled users of the Evolution NTX both scan modes are suitable. According to experience the best graphics has been received in the "Parallel" mode, because you are starting at the same point and traveling in the same direction. It is also easier to control your walking speed.

Especially in uneven territories like mountain sides, acclivities or other inclined layers the parallel mode is preferred. When it comes to speed, the experienced user will very often use the Zig-Zag mode for the initial scan to determine if there are anomalies in the area worth further research.

8.2.3 Manual or automatic impulse mode?

Large even or passable surfaces are commonly measured in the automatic mode. The manual impulse mode is mostly used for difficult uneven terrain, areas where there is quite a bit of growth and if the measurement result needs to be very accurate.

In terrains with difficult access like mountain cliffs and sides, slippery surfaces or overgrown areas, it is wise to use the manual impulse mode. Because each impulse will be released manually, you have enough time to position the probe in the correct way and record the measured value. In this way, you can also measure accurately previously marked dots of a predefined grid.

8.2.4 Tips from the trainers themselves

When conducting scans, there are some extremely important items that need to be noted. First of all it is crucial that you relax. When you are tense, you are putting too much pressure on yourself to do the scan correctly; often resulting in errors.

- Newly buried targets are difficult to see. Many users receive the equipment and the first thing they do is go out and bury an object. When an object goes into the ground it changes the natural signature of the soil and creates some kind of noise. Usually the buried object has a weaker signature than the unnatural noise and therefor is not detectable. So taken scan images will not show the buried item but visualize the noisy area in blue colors. After the item has been seasoned, meaning it has been in the ground for a complete cycle of seasons (usually a year), the noise gets reduced and the signature of the buried object becomes visible again.

- Train on known targets. In the training course at the factory we have several objects that have been buried for years, just like real targets in the field. These targets can be quickly and easily identified because they are not natural to the soil. Other targets that you can use in your own area are buried utilities. Pipes, tanks, electrical, sewers, graveyards, etc... Most of these items can be found in every community, town or city. This is where you need to begin your training if you are going to self-train.

- Get professional training. When you take advantage of receiving the training, either from the factory or a qualified dealer, you will understand not only the use and operation of the OKM detector but also the software so much easier and be able to identify targets as well as errors.

- Do not rely on just one scan measurement. So many users go out into the field and they make a measurement and see a target. Instead of repeating the scan and reproducing it several times, they go out and get a shovel and dig. On very rare occasion will the first scan be perfect. Even the trainers do multiple scans to ensure that they are not looking at areas of mineralization or an error.

- Soil Mineralization – Oh! Very frustrating! We will all experience it. When you are in an area that is known to have pockets of mineralization, be prepared to conduct more scans than normal.

  - Clay is probably the number one foe. Depending on the iron content of the clay will determine how strong the attenuation will be. A quick rule of iron content is how dark it is, it can vary from a light gray up to a dark orange. The darker the more iron it will have in it.

  - Sand is usually very clear and easy to hunt in. There are two factors of sand that need to be noted. Sand where the ground water is very shallow, meaning that the ground water is usually just a couple of meters from the surface or desert sand where it is very arid. In desert sand, the targets can be situated 3x deeper than indicated.

- Farmland is another area to take note of. In modern farms, so many nutrients and fertilizers are introduced creating an unnatural area of mineralization.
- Rocky mountainous areas. Areas with many mountains are also riddled with patches of mineralization. Mountainous areas are created from faults in the earth and this is probably the biggest area for natural treasures as well as mineralization.

CHAPTER 9

Tutorial

This chapter gives a detailed step-by-step procedure, which explains the process of a measurement by means of some selected examples.

9.1 Measurement in operating mode "Live Sound"

Before scanning the area in the "3D Scan" operating mode, the field should be searched via "Live Sound". In that way small metallic objects near the surface can be detected efficiently.

Switch on your detector as described in chapter 6 „Operating modes“ on page 17. Now select the "Live Sound" operating mode by touching with your finger tip and you will see the screen from figure 9.1 on the display of your control unit.

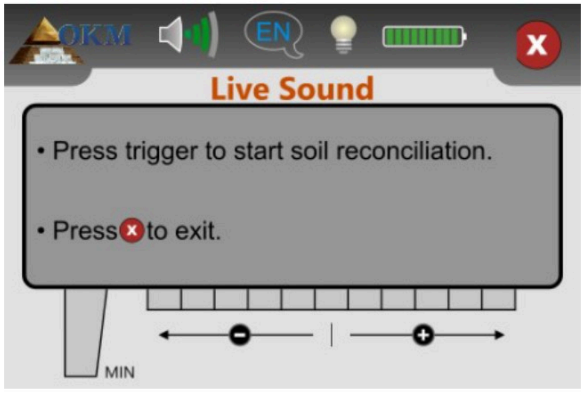


Figure 9.1: Start soil reconciliation in operating mode "Live Sound"

Position yourself on a potential neutral place of your scan area, i. e. a place without metal objects underneath. This is where you need to conduct the soil reconciliation (ground balance) for a much more accurate search.

Hold the probe straight downwards with a distance of approx. 5 - 10 cm above the ground and push the trigger button of the probe. You will see the screen from figure 9.2 on your display.

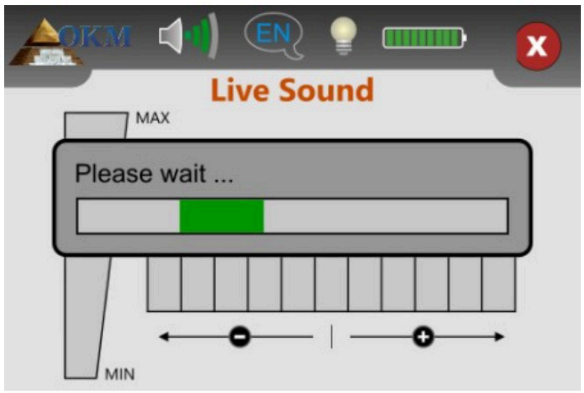


Figure 9.2: Processing soil reconciliation in operating mode "Live Sound"

As long as the green progress bar is visible you have to sweep the search coil over the ground. After finishing the soil reconciliation the screen from figure 9.3 appears in the display of the control unit.

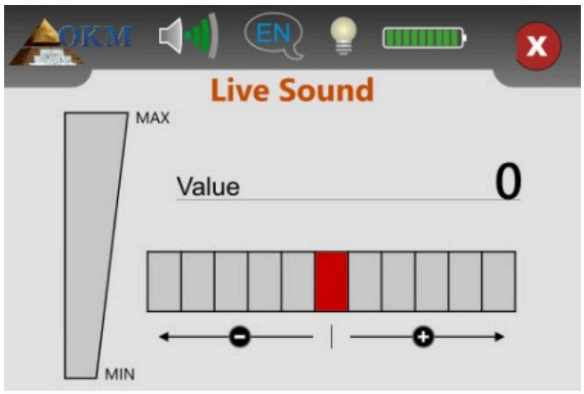


Figure 9.3: "Live Sound" when showing no metals

Only now the „Live Sound" operating mode is ready to search for hidden metal objects. Sweep your search coil over the ground like you did before during the soil reconciliation. Keep the same distance to the surface and the same sweeping speed while walking over the ground. As soon as you pass over a metal object, which is in reach of the coil, the displayed number of the value increases and is also shown graphically. Furthermore a sound signal is generated. The maximum value is always 100.

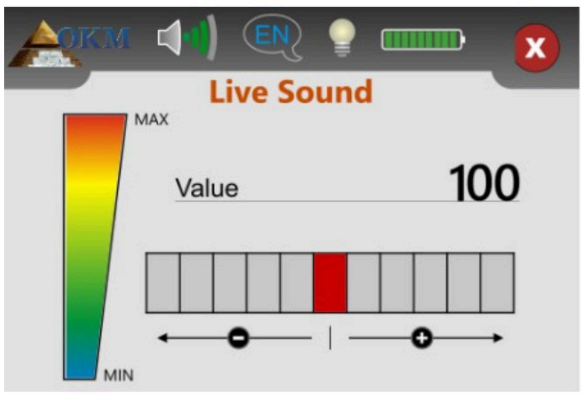


Figure 9.4: "Live Sound" when showing metals

If you start the “Live Sound” operating mode and hear a constant tone or a combination of tones that are not decipherable then please try one of the following options:

1. Exit the operating mode by touching the icon. Restart the “Live Sound” mode again and this time do the soil reconciliation in a different area.

2. Change the sensitivity of the metal detector. By default the neutral level (red) is selected. Touch on any of the 5 levels to the right to increase the sensitivity or to the left side to decrease the sensitivity.

9.2 Measurement in "3D Scan" operating mode

Figure 6.9 represents a typical measure area which should be scanned with the Evolution NTX. The red frame marks the borders of the measure area. For this example we are using the following parameters:

- **Metal detector: "Yes"**
  The measurement will be processed with the metal detector activated and a soil reconciliation (ground balance) has to be processed before the measurement can be conducted.

- **Field length: "5 m"**
  The approximate length of the field is 5 m.

- **Scan mode: "Zig-Zag"**
  Select “Zig-Zag” mode when the area to be scanned is easily walkable and accessible.

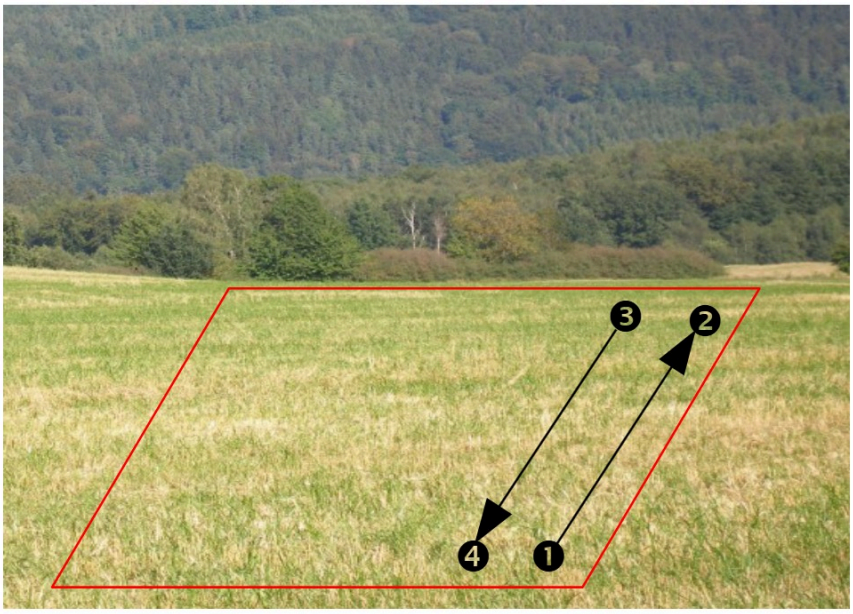


Figure 9.5: Measure area for a survey in mode "3D Scan"

Now go to point ❶ of the field and select the "3D Scan" operating mode from the main menu. You will see the screen from figure 9.6 on your display. There you can choose whether to use the metal detector during the measurement or not.



Figure 9.6: Activate metal detector in operating mode "3D Scan"?

We decided to use the metal detector with our scan and choose “Yes”. The screen from figure 9.7 will appear on the display.

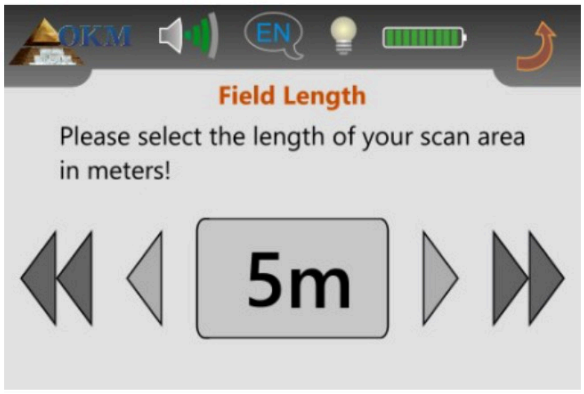


Figure 9.7: Select field length in operating mode "3D Scan"

Now you have to select the length of the field in meters. In our example the length of each line is 5 m and therefor you select "5 m". Confirm that by touching the selection itself and you will see the screen from figure 9.8.

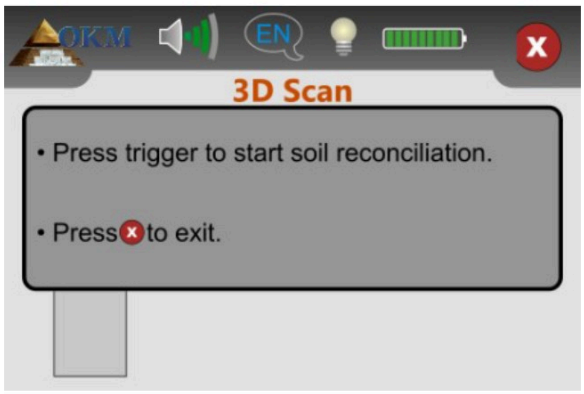


Figure 9.8: Start soil reconciliation in "3D Scan" operating mode

Before you start the measurement, you have to do a soil reconciliation with your activated metal detector. Hold the probe downwards with the search coil approx. 5 – 10 cm over the ground. Push the trigger button and sweep the probe slowly from one side to the other. During the soil reconciliation procedure the screen from figure 9.9 is displayed. As long as the green progress bar is visible, sweep the probe from side to side. Do not sweep the unit too fast or too slow.

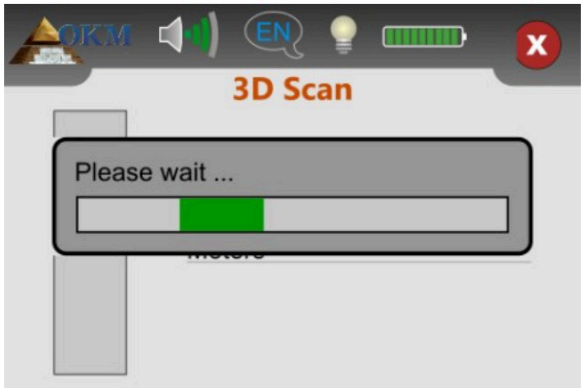


Figure 9.9: Processing soil reconciliation in operating mode "3D Scan"

As soon as the screen from figure 9.10 appears on the display, the soil reconciliation is finished and the measurement can start.

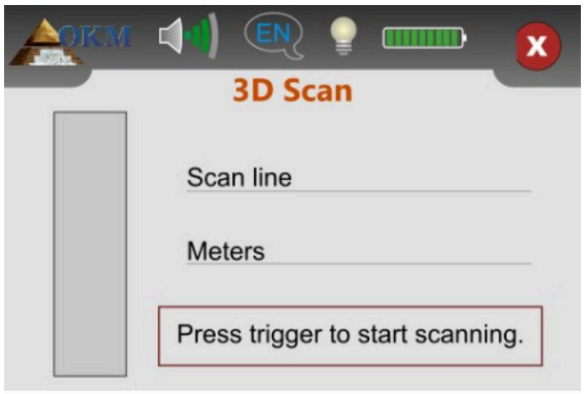


Figure 9.10: Start scanning in operating mode "3D Scan"

Position yourself on the beginning of the 1. scanning path, i. e. point ❶ from figure 9.5 on page 46 and hold the probe straight downwards as you already did during the soil reconciliation. Now push the trigger to start the measurement. Walk evenly and with constant speed to the end of the first scan line (point ❷). As soon as the message from figure 9.10 appears on the display again, you should have reached point ❷.

The right walking speed is just a matter of practice and is not always possible in the beginning. Certainly you will walk too short or too long but the more you practice the better you will manage the walking - also for bigger fields.

Now you have to go to point ❸ and push the trigger again to measure the second scanning path too. As soon as the message from figure 9.10 appears again, you should have reached point ❹.

Repeat that procedure with all remaining scan lines until the whole field has been measured. After finishing the measurement touch the ✖ icon to save the measured data and return back to the main menu.

Remember the selected field length before leaving the operating mode "3D Scan"! This value is important for the data transfer to the computer!

Now all measured values are stored in the internal memory of the device and can be transferred to the computer for detailed analysis.

OKM GERMAN DETECTORS

Based in Altenburg, we have been developing and manufacturing geophysical detectors since 1998. Our unique detection technology makes buried objects and structures visible.

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